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SNOW SURVEYS AND IRRIGATION WATER FORECASTS FOR MISSOURI AND ARKANSAS RIVERS

March 1, 1939

The following data pertaining to snow surveys and irrigation water-supply forecasts are provided by the Bureau of Agricultural Engineering of the U. S. Department of Agriculture, in cooperation with State departments, other Federal bureaus and local organizations. The snow measurements are made principally by field personnel of the following organizations: Forest Service, National Park Service, Bureau of Reclamation, U. S. Geological Survey, War Department and State Experiment Stations. This work is otherwise conducted cooperatively with the State Engineers of Wyoming and Colorado, and various municipalities, irrigation associations, power companies and others. Precipitation records are supplied by the U. S. Weather Bureau.

P R E C I P I T A T I O N D A T A

WATERSHED	STATE	Precipitation October 1 to February 28	Departure From Normal	Precipitation		Departure from Normal
				February	Inches	
		Inches	Inches			Inches
Missouri	East. Mont.	2.91	-0.06	0.30		-0.16
Missouri	Cent. Mont.	4.17	+0.41	0.51		-0.09
Missouri	North Wyo.	7.08	+1.62	0.93		-0.01
North Platte	Wyoming	4.31	-0.33	0.85		-0.01
South Platte	Colorado	3.96	+0.28	0.81		+0.04
Arkansas	Colorado	4.02	+0.72	1.70		+0.80

For the North Platte River drainage in Colorado and Wyoming, 14 snow courses show about 5 percent less water content than for March 1, last year. The depth of snow cover over this drainage is slightly greater than it was a year ago. In the South Platte River drainage in Colorado, 12 snow courses show the average water content to be about 8 percent greater than for March 1, 1938. The average water content for 5 snow courses in the Arkansas River drainage is 36 percent greater than it was for these courses last year at this same time. For 7 snow courses on the Poudre the average water content is 8 percent less than last year, and for the Laramie River the record for 8 snow courses shows the water content to be slightly less than a year ago.

Reservoir storage in the South Platte drainage is very good, and considerable water is still available for storage. Some reservoirs are now filled to capacity. The total reservoir storage in the Arkansas Valley,

to date, is reported to be 155,600 acre-feet, which is a gain of 25,750 acre-feet since November 1, 1938. For the North Platte River drainage the storage in Wyoming is two-thirds more than it was last year at this time.

Soil moisture conditions are exceptionally good in the South Platte, North Platte and Arkansas Valleys in Colorado and Wyoming. In both eastern Montana and Wyoming soil moisture is deficient. The soil in the mountain areas of these drainage basins is well saturated. Soil moisture conditions are good also in the Black Hills in South Dakota.

Over the Missouri and Arkansas drainage areas the present outlook for irrigation water supplies may be summarized as follows: For the North Platte, the supply may be expected to approach that of last year. Because of the water in storage now, there should be an ample supply to meet normal needs this coming summer. In the South Platte drainage, in Colorado, the prospects are good. With much larger amounts of water in storage at this time, as compared with previous years, and higher water content of the snow cover, the outlook for the coming season is even better than it was a year ago. Because of the decided increase in the water content of the snow cover on the Arkansas River watershed over that of last year and the present reservoir storage, there is at this time an exceptionally good prospect for an adequate water supply in this valley for the coming season.

MISSOURI AND ARKANSAS RIVERS

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Issued Mar. 10, 1939. Colo. Expt. Station, Fort Collins, Colo.

Main Drainage and No. Snow Course		Local Drainage	State	Location		Elev.	National Forest	Mar. 1. Snow Course Measurements				
				Locality	Description			Avg.	In.	In.	Avg.	In.
JEFFERSON RIVER												
6	Camp Creek*	Red Rock Cr.	Idaho	6 mi. N. Spencer	21-13N-36E	6800	Targhee	34.6	40.6	32.0	11.9	7.3
7	East Fork R.S.*	Rock Creek	Mont.	13mi.NE. Sula	16-2N-17W	5400	Bitterroot	21.0			5.8	
	Elkhorn Hot Spgs.	Wise River	"	8mi.N.Polaris	15-4S-12W	8450	Beaver Head	26.6			6.8	
9	Gibbons Pass	N.Fk.Bighole	"	Gibbons Pass	4-2S-19W	7100	Bitterroot	52.2			16.8	
7	Moose Creek*	N.Fk.Bighole	Idaho	3mi.S.Gibbons P.	27-27N-21E	6200	Salmon	43.4	37.4	45.0	11.9	12.5
26	Pipestone Pass	Pipestone Cr.	Mont.	Pipestone Pass	11-1N-7W	7200	Deer Lodge	12.0			2.8	
				Average for			Drainage	39.0	31.6	38.5	10.5	9.9
MADISON RIVER												
2	Aster Creek*	Firehole River	Wyo.	Lewis Lake	44-3N110-6W	7700	Yel.Nat.P.	74.1	81.0	74.0	25.9	24.2
3	Big Springs*	South Fork	Idaho	Big Springs	34-14N-44E	6500	Targhee	60.3	53.0	60.0	18.1	18.3
	Hebgen Dam	Cabin Creek	Mont.	Hebgen Dam	22-11S-3E	6550	Gallatin	45.8			14.4	
8	Lewis L.Divide*	Firehole R.	Wyo.	3mi.S.Lewis L.	44-2N110-7W	7900	Yel.Nat.P.	104.0	107.0	111.0	33.5	35.1
11	Norris Basin	Gibbon River	"	Norris Basin	44-5N110-7W	7500	"	32.7			8.8	
	Twenty-One Mile*	Greyling Cr.	Mont.	8mi.S.Gallatin	1-11S-5E	7150	"	52.5			16.8	
15	West Yellowstone	South Fork	Mont.	W.Yellowstone	34-13S-5E	6700	Gallatin	34.0			9.6	
				Average for			Drainage	79.5	58.0	81.7	25.5	25.9
GALLATIN RIVER												
	Devil's Slide	Hyalite Cr.	Mont.	20mi.S.Bozeman	14-5S-6E	8100	Gallatin	49.7			13.6	
	Hood Meadow	"	"	19mi.S.Bozeman	22-4S-6E	6600	"	22.9			5.3	
	Hood Meadow Extn.	"	"	14mi.S.Bozeman	22-4S-6E	6600	"	23.0			5.3	
	Mystic Lake No.1	Bozeman Cr.	"	12mi.SE.Bozeman	31-3S-7E	6600	"	22.6	18.0	30.3	5.1	5.7
	Mystic Lake No.2	"	"	12mi.SE.Bozeman	31-3S-7E	6600	"	22.3	17.4	29.5	4.8	5.6
	Twenty-one Mile	Gallatin R.	"	8mi.S.Gallatin	1-11S-5E	7150	Yel.Nat.P.	52.5			16.8	
				Average for			Drainage	22.5	30.6	29.9	4.9	5.6

*Adjacent Drainage

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				Locality	Description			Avg.	In.	1938	1939	Av.	Water Content
MISSOURI RIVER													
5	Chessman Res.	Tennile	Mont.	11mi. SW. Helena	2-8N-5W	6200	Helena			14.8		In.	In.
35	Tennile Cr. Lower	"	"	17mi. SW. Helena	13-8N-6W	6250	"			15.6		3.9	
36	Tennile Cr. Middle	"	"	"	"	6800	"			24.2		3.3	
37	Tennile Cr. Upper	"	"	"	"	8000	"			27.2		5.7	
30	Stemple Pass	Canyon Cr.	"	Stemple Pass	16-13N-7W	6900	"			33.7		7.6	
	King's Hill	Belt Cr.	"	21mi. NW. Sul. Spgs.	35-13N-7E	7950	Lewis & Clark			35.8		9.2	
	Orville Harris	Mussellshell R.	"	12mi. E. W. S. Spgs.	31-10N-9E	6500	"			--		10.6	
10	Goat Mountain	South Fork	"	26mi. W. Gilman	47-5N-12-9W	7000	"			--		--	
	Grasshopper	Grasshopper Cr	"	6mi. E. W. S. Spgs.	19-9N-8E	7000	"			28.2		7.2	
										--		--	
										16.7		--	
										17.1		6.8	
Average for Drainage													
										25.6			
MARIAS RIVER													
	Desert Mountain*	Cutbank Cr.	Mont.	4mi. S. Belton	24-31N-19W	5600	Flathead			37.0		10.7	
18	Marias Pass	Two Medicine	"	Summit	48-3N-13-4W	5250	Glacier NP			44.0		15.6	
										40.5		13.1	
Average for Drainage													
YELLOWSTONE RIVER													
	Blacktail Deer Cr	Blk. Tail Deer	Wyo.	11mi. SE. Gardiner	44-9N-10-6W	7500	Yel. Nat. P.	34.0		34.0		9.5	
	Camp Senia	W. Br. Rock Cr.	Mont.	10mi. W. Red Ldge.	2-8S-18E	7870	Custer	18.1		14.4		3.0	
	Canyon	Tower Cr.	Wyo.	8mi. N. Canyon Jct.	44-7N-11C-5W	7750	Yel. Nat. P.			36.7		9.9	
	Cooke City	Soda Bottle Cr	Mont.	Cooke City	25-9S-14E	7400	Absaroka	27.7		26.0		7.0	
	Crevice Mtn. #1	Yellowstone	Mont.	6mi. E. Gardiner	26-9S-9E	8400	Yel. Nat. P.	--		--		--	
	Crevice Mtn. #2	Yellowstone	Mont.	6mi. E. Gardiner	25-9S-9E	8200	"	--		--		--	
	Beaver Dams	Blk. Tail Deer	Wyo.	11mi. SE. Gardiner	44-9N-10-6W	7200	"	23.9		25.0		6.7	
	Lake Camp	Yellowstone	Wyo.	3mi. NE. Fishing Br.	44-6N-10-4W	7850	"			40.6		10.6	
	Lupine Creek	Lupine Cr.	Wyo.	11mi. SE. Gardiner	44-9N-10-6W	7300	"	29.3		30.0		7.5	
	Porcupine	Porcupine Cr	Mont.	12mi. NE. Wilsall	10-4N-10E	6500	Absaroka	--		--		--	
								26.6		29.5		7.7	
												6.5	

*Adjacent Drainage

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Main Drainage and Snow Course		Local Drainage	State	Location Locality	Description	Elev.	National Forest	Mar. 1 Snow Course Measurements					
No.	Snow Course							Av. Snow Depth	1938	1939	Av. Water Content	1938	1939
								In.	In.	In.	In.	In.	In.
19	SHOSHONE RIVER	Shoshone R.	Wyo.	Brooks Lake	23-44N-110W	9200	Washakie	49.8	49.3	55.6	14.1	14.3	16.1
19	BIGHORN RIVER												
19	Brooks Lake No. 2	Wind River	"	Brooks Lake	23-44N-110W	9200	Washakie	49.8	49.3	55.6	14.1	14.3	16.1
22	Roaring Fork	Roaring Fk.	"	16mi. SW Lander	7-31N-101W	10200	Washakie	16.8	17.4	19.6	3.6	2.6	4.1
20	Sheridan Cr. R. S.	Sheridan Cr.	"	16mi. NW Dubois	3-42N-109W	7500	Washakie	19.7	14.7	25.0	3.2	3.1	3.3
21	Whorten Meadow	Roaring Fk.	"	16mi. SW Lander	18-31N-101W	9200	Washakie	11.6	6.7	16.0	2.7	1.5	3.5
	POWDER RIVER					Average for Drainage		24.5	22.0	29.0	5.9	5.4	6.7
30	Red Fork	Middle Fk.	"	23mi. W. Kaycee	18-43N-85W	7500	Off Forest	--	25.6	--	--	5.8	--
	NO. PLATTE RIVER												
51	Big Creek Lake	Big Creek	Colo.	5mi. SW. Pearl	9-11N-82W	9000	Routt	--	32.9	--	--	9.0	--
7	Bottle Creek	Encampmt Cr.	Wyo.	7mi. SW. Encampmt	24-14N-85W	8200	Medicine Bow	46.3	44.3	48.3	13.5	13.2	13.7
8	Columbine Lodge	Grizzly Cr.	Colo.	Rbt. Ears Pass	21-5N-82W	9300	Routt	68.4	59.1	68.4	20.8	18.4	20.8
37	North French Cr.	N. French Cr.	Wyo.	Cent./Saratoga	27-16N-80W	10200	Medicine Bow	77.2	76.8	77.7	28.0	30.4	25.6
38	N. Barrett Cr. #2	N. Barrett Cr.	"	"	30-16N-80W	9400	"	55.8	58.6	60.6	16.6	19.9	18.0
9	Old Battle	Encampmt Cr.	"	12mi. W. Encampmt	29-14N-85W	9800	"	84.1	69.5	84.7	27.3	24.4	27.5
7	Park View	Illinois Cr.	Colo.	7mi. SE. Rand	24-5N-78W	9200	Routt	34.9	31.8	37.1	9.4	9.1	10.2
39	Ryan Park No. 2	Barrett Cr.	Wyo.	Cent./Saratoga	34-16N-81W	8400	Medicine Bow	35.9	38.9	41.3	9.9	11.3	11.4
8	Webber Spring	Encampmt Cr.	"	10mi. W. Encampmt	27-14N-85W	9000	"	51.6	45.2	58.1	15.4	14.8	16.0
1	Cameron Pass	Michigan Cr.	Colo.	Cameron Pass	2-6N-76W	10300	Roosevelt	51.7	54.3	59.7	16.6	20.2	17.2
	SWEETWATER RIVER					Average for Drainage		56.1	51.1	59.7	17.5	17.1	16.7
29	Grannier Meadows	Rock Creek	Wyo.	20mi. SW. Lander	19-30N-100W	9000	Washakie	36.0	30.9	36.4	8.7	7.4	9.1

*On adjacent drainage

#Readings on original course

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No.	Snow Course			Locality					Avg. 1938	In. 1938	Av. 1939	In. 1939	Content	
LARAMIE RIVER														
3	Brooklyn Lake	Nash Fork	Wyo.	7mi. NW. Centennial	11-16N-79W	10200	Medicine Bow	54.2	53.7	51.0	18.3	19.1	17.6	
11	Fox Park	Fox Creek	"	Fox Park	21-17N-78W	9200	"	28.5	31.0	31.6	7.3	9.1	7.6	
36	Hairpin Turn No. 2	Nash Fork	"	5mi. NW. Centennial	24-16N-79W	9500	"	30.3	30.0	30.7	8.3	8.6	8.1	
35	Libby Lodge No. 2	Libby Cr.	"	3mi. NW. Centennial	29-16N-78W	8700	"	28.0	23.5	32.4	7.2	5.7	8.7	
34	Pole Mountain No. 2	Soldier Cr.	"	10mi. SE. Laramie	35-15N-72W	8700	"	19.7#	22.8	27.7	4.4#	5.5	6.2	
4	W. Port. G.-P. Tunnel	Laramie R.	Colo.	4mi. N. Chambers L.	7-8N-75W	8600	Roosevelt	28.6	27.8	32.5	7.3	8.0	8.1	
50	Deadman Hill*	Deadman Cr.	"	10mi. W. R. Feather	26-10N-75W	10200	"	43.3	43.6	46.3	10.8	12.0	10.6	
71	Deadman Hill No. 2*	Deadman Cr.	"	8mi. SW. R. Feather	6-9N-74W	10200	"	38.7	36.3	41.1	9.5	9.6	9.4	
Average for Drainage								33.7	33.6	36.7	9.1	9.7	9.5	
SOUTH PLATTE RIVER														
14	Hoosier Pass	S. Platte	Colo.	Hoosier Pass	13-8S-78W	11400	Pike	35.5	33.9	47.1	8.0	8.0	11.3	
15	Fairplay	S. Platte	"	Fairplay	33-9S-77W	10000	"	3.2	T	6.4	0.3	T	0.6	
Average for Drainage								19.3	17.0	26.7	4.1	4.0	5.9	
CROW CREEK														
34	Pole Mountain No. 2	Crow Creek	Wyo.	10mi. SE. Laramie	35-15N-72W	8700	Medicine Bow	19.7#	22.8	27.7	4.4#	5.5	6.2	
POUDRE RIVER														
3	Big South	Poudre R.	Colo.	2mi. E. Chambers L.	33-8N-75W	8600	Roosevelt	7.5	5.5	9.4	1.4	1.7	1.0	
1	Cameron Pass	Joe Wright Cr	"	6mi. W. Chambers L.	2-6N-76W	10300	"	51.7	54.3	59.7	16.6	20.2	17.2	
2	Chambers Lake	Poudre R.	"	Chambers L.	6-7N-75W	9000	"	19.5	20.0	25.9	4.8	5.9	5.0	
50	Deadman Hill	N. Poudre R.	"	10mi. W. R. Feather	26-10N-75W	10200	"	43.3	43.6	46.3	10.8	12.0	10.6	
71	Deadman Hill #2	N. Poudre R.	"	8mi. SW. R. Feather	6-9N-74W	10200	"	38.7	36.3	41.1	9.5	9.6	9.4	
68	Hour Glass Lake	Little S. Poudre	"	2mi. NW. Pingree P.	18-7N-73W	9500	"	26.5	22.3	30.8	5.6	5.2	6.1	
65	Lake Irene*	Big S. Poudre	"	1mi. SW. Milner P.	8-5N-75W	10600	Ry. Mtn. N.P.	59.1	60.2	58.0	19.5	20.7	18.2	
Average for Drainage								35.2	34.6	38.7	9.7	10.8	9.6	
BIG THOMPSON														
67	Fall River	Fall River	"	12mi. W. Estes P.	6-5N-74W	10600	Ry. Mtn. N.P.	57.1	56.5	57.8	17.0	17.2	16.9	
65	Lake Irene*	Big Thompson R.	"	1mi. SW. Milner P.	8-5N-75W	10600	"	59.1	60.2	58.0	19.5	20.7	18.2	
Average for Drainage								58.1	58.3	57.9	18.2	19.0	17.6	

*On adjacent drainage
#Readings on original course.

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							Av. Snow Depth	1938	1939	Avg.	In.	In.
ST. VRAIN RIVER												
41 Wild Basin	N. St. Vrain	Colo.	5 mi. W. Allens P.	24-3N-74W	10000	Ry. Mtn. N.P.	36.1	33.2	43.9	8.6	9.1	9.1
BOULDER CREEK												
5 E. Port. Moffat T.	S. Boulder Cr.	"	East Portal	2-2S-74W	9400	Roosevelt	12.5	9.6	15.5	3.3	3.2	3.5
60 University Camp #2	N. Boulder Cr.	"	5 mi. SW. Ward	28-1N-73W	10300	"	35.9#	48.3	59.4	11.8#	16.3	19.1
				Average for Drainage			24.2	29.0	37.4	7.5	9.8	11.3
CLEAR CREEK												
61 Loveland Pass #2	Clear Creek	"	10 mi. W. Georgetown	27-4S-76W	10100	Arapaho	41.8#	41.7	50.5	10.7#	11.3	12.9
ARKANSAS RIVER												
74 LaVeta Pass #2*	Cuchara Cr.	"	LaVeta Pass	22-28S-70W	9300	San Cristobal	34.7#	---	43.8	8.0#	---	10.3
42 Marshall Creek*	Poncha Cr.	"	Marshall Pass	24-48N-6E	10800	Cochetopa	44.8	34.0	47.8	12.0	7.1	12.3
43 Poncha Creek	Poncha Cr.	"	Marshall Pass	19-48N-7E	10500	"	30.9	26.2	35.0	8.8	6.1	9.6
19 Tennessee Pass	Tennessee Cr.	"	Tennessee Pass	21-8S-80W	10200	"	36.2	32.9	40.4	8.9	6.5	10.6
21 Twin Lakes Tun.	Lake Cr.	"	9 mi. W. Twin Lakes	22-11S-82W	10500	"	35.8	33.4	38.2	10.0	10.4	9.6
48 Whiskey Creek	Whiskey Cr.	"	Whiskey Cr. Pass	31-32N-69W	10200	Maxwell Grant	---	---	33.8	---	---	8.3
78 Four Mile Park No. 2	Lake Cr.	"	3 mi. SW. Twin Lakes	23-11S-81W	9700	Cochetopa	---	---	15.5	---	---	3.9
79 Fremont Pass No. 2*	E. Fork Ark. R.	"	Fremont Pass	2-8S-79W	11400	Arapaho	54.0#	47.8#	56.8	13.6#	12.4#	15.7
				Average for Drainage			39.4	34.9	38.9	10.2	8.5	10.0

*On adjacent drainage

#Readings on original course.

(1725-39)

